

Human Biology-Fish Adaptations: Are you In-Seine? Teacher's Guide

Subject: Integrated Science (Life; Earth-Space; Physical)

Topic: Physical Characteristics of Fish

Summary: Students will use a seine net (alternatively, dip nets) to collect fish and observe, measure, record, and compare selected structural features of the collected specimens. Students will differentiate between physical and behavioral adaptations and infer potential beneficial effects of various adaptations, especially those that relate to mobility and feeding

After completing the field lab, students will be able to:

Objective(s):

1. Identify common fish found in the Ichetucknee
2. Compare varieties of fish and their respective physical adaptations

Ecosystem(s): Freshwater Wetlands; Rivers/Springs

Equipment:

- Ruler and tape measure
- Digital camera (optional)
- GPS
- 20-foot seine net
- Wading Boots
- Reference chart or guide to common freshwater fish of the Ichetucknee River
- Data sheets, clipboards, pencils
- Dip nets (several)—(optional)
- Collecting buckets and shallow pans

Background:

- Vocabulary: Adaptation, natural selection, predator, survival
- Reference Material: Fish Adaptation Chart, native fish overheads
- Equipment Training: Dip and seine nets if used by students

Procedure (Engage; Explore; Explain)

1. What adaptations might you make if you suddenly found yourself semi-transformed into a fish living in the Ichetucknee River?
2. Students assemble at the ISSP Education Center and transport to the Grassy Flats netting area.
3. What body part of a fish do you think is the most vital to its survival?
4. Ask students which special tool they might choose to carry out a particular task. For example, for cutting down a large tree, what type of saw could be used? Would a different saw be used for clearing a path through vines or thick underbrush? Or for trimming a hedge? Have students compare such choices of tools with the special adaptations animals use for hunting and eating food, hiding from predators, or getting from place to place. Discuss how fish in particular might use different variations (adaptations) in their common body plan (like fins and mouthparts) to survive in different or similar aquatic environments.
5. Demonstrate proper use of seine net or dipping nets.
6. Divide students into groups and distribute clipboards, data sheets, and collecting buckets or pans among groups.
7. Using nets, staff and assistants will capture several different types of small fish and distribute into buckets or shallow pans among groups.
8. Students will complete the data sheet with drawings, observations, and measurements (where appropriate), of various characteristics among 3 different types of fish.
9. After additional discussion and observations on fish behaviors, students will answer the assessment questions.

Sunshine State Standards:

Science: SC.F.1.3.7; SC.F.2.3.3; SC.G.1.3.2; SC.G.1.3.3; SC.G.2.3.3; SC.G.2.3.4; SC.H.1.3.4; SC.H.3.3.2

Language Arts: LA.A.1.3.3; LA.B.2.3.1; LA.C.1.3.1

Mathematics: MA.B.2.3.1; MA.B.4.3.1,2; MA.D.1.3.1,2

Social Studies: SS.A.2.3.4; SS.A.2.3.6; SS.A.6.3.2; SS.A.6.3.3; SS.B.1.3.1; SS.B.2.3.1-9

Human Biology-Fish Adaptations: Are you In-Seine? Student Data Sheet
General Information

Full Name:		Date:	
School (teacher):		Time:	
Latitude:		Longitude:	

Student Hypothesis and Rational

If a snake or eel-like body shape is adapted to rocks and crevices, then we will find (more/less) _____
 fish with this body type in an area with a sandy bottom with few rocks an crevices because . . . _____

Field Observations/Measurements/Data

Trait	Fish 1	Fish 2	Fish 3
Body Shape (skeletal system)			
Tail Shape (skeletal system)			
List all movable joints (skeletal system)			
Gills-location and size (respiratory system)			
Eyes-Location/size (sensory) eg: side of head, forward facing, upward facing, etc.			
Mouth (location and size) (digestive system)			
Coloration/patterns (integumentary system)			
EXTREME PERSON DRAWING (choose a characteristics and apply it to a human)			
Based on the adaptations above, describe the “lifestyle” that this fish may have.			

Fish Adaptations: Are you In-Seine?

Assessment

1. What does the tail tell you about the fish?

2. Based on its mouth and teeth, where do you think fish #2 might find its food?

3. How might the color of the fish influence its behavior?

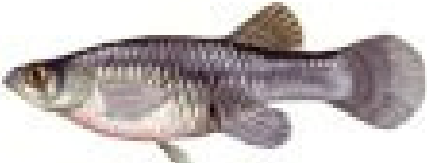

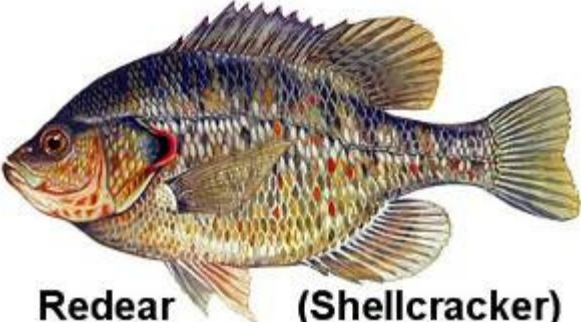
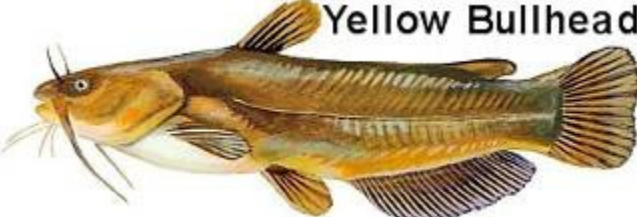
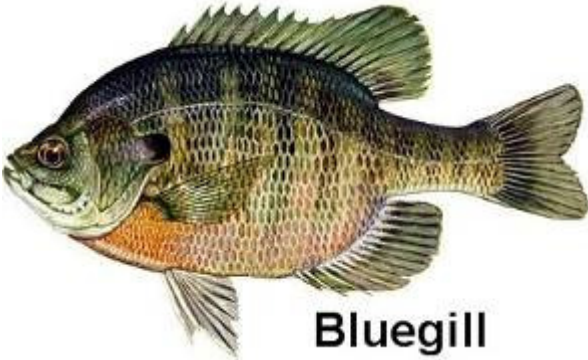

4. How might these fish be different if their habitat was completely dark?




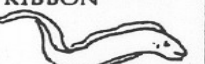
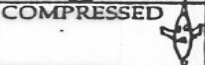
5. Fishing is an American pastime. What traits do people look for in fish?

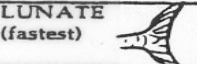


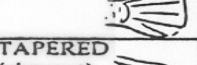
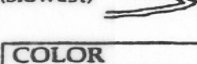
Fish Adaptations: Are you In-Seine?





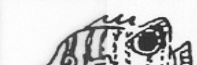
Reference Chart




Common Freshwater Fish of the Ichetucknee River (not actual size)

 <p>Mosquitofish</p>	 <p>Sailfin molly</p>
<p>Mosquitofish, <u>Gambusia holbrooki</u> (Poeciliidae)</p>	<p>Sailfin molly, <u>Poecilia latipinna</u> (Poeciliidae)</p>
 <p>Redear (Shellcracker)</p>	 <p>Yellow Bullhead</p>
<p>Shellcracker (Redear sunfish), <u>Lepomis microlophus</u> (Centrarchidae)</p>	<p>Yellow catfish (Yellow bullhead), <u>Ameiurus</u> (formerly <u>Ictalurus</u>) <u>natalis</u> (Ictaluridae)</p>
 <p>Bluegill</p>	 <p>Suwannee Bass</p>
<p>Bluegill, <u>Lepomis macrochirus</u> (Centrarchidae)</p>	<p>Suwannee bass, <u>Micropterus notius</u> (Centrarchidae)</p>

BODY SHAPE	DESCRIPTION	EXAMPLE
FUSIFORM 	streamlined and cylindrical; very fast and can swim continuously for long distances	bonito, mackerel, anchovy
DEPRESSED 	flattened from back to belly like a pancake; ambush prey with short bursts of speed; burrow into sand	skates, rays, goosefish
SPHERE 	rounded, globe-like; slow swimmers; may attract prey to them with light and lures	porcupine fish, puffer fish, anglerfish
RIBBON 	snake-like; slow swimmers but easily move through crevices; hide under rocks or in cracks and ambush prey which come too near their hideout	wolf eels, moray eel
COMPRESSED 	flattened side to side; sharp, quick turns and very maneuverable; viewed head-on they almost seem to disappear	surf perch, opaleye, flounder, angelfish

TAIL SHAPE	DESCRIPTION	EXAMPLE
LUNATE (fastest) 	fastest swimmers, maximum speed with minimum effort over long distances.	marlin, mackerel, dolphinfish
FORKED 	moderately fast, continuous swimmers	anchovy, herring
SQUARED 	very maneuverable, capable of bursts of speed for short distances	rockfish
ROUNDED 	very maneuverable, capable of bursts of speed for short distances	senorita, goby
TAPERED (slowest) 	slow swimmers, use body undulations to swim	moray eel

COLOR PATTERNS	DESCRIPTION	EXAMPLE
CAMOUFLAGE 	match surroundings to blend in and hide	flounder, stonefish, cabezon
DISRUPTIVE COLORATION 	spots, stripes and patches of color breakup and diffuse the actual outline	kelpfish, sergeant-major
COUNTER-SHADING 	dark back and lighter belly hides fish from predators as sunlight penetrates from above	anchovy
ADVERTISING 	1. warning to stay away from poisons or spines; 2. attract mates, defend territories 3. clean other fish	1. lionfish 2. California Sheephead 3. senorita
DECEIVING 	1. false eyespots confuse predators into attacking the wrong end or miscalculating size/shape of fish; 2. fish resembles objects of no interest to enemies; 3. fish mimics something: a. helpful like a cleaner or b. dangerous like a poisonous seasnake	1. Big Skate, butterfly fish 2. stonefish, sargassum fish 3. a. blenny, b. snake-eel

MOUTH, TEETH, GILL RAKERS	DESCRIPTION	EXAMPLE
MOUTH ORIENTATION 	1. oriented upwards denotes surface feeder or feeds on prey above it; 2. downwards suggests bottom-grubber	1. stargazer, stonefish 2. goatfish
MOUTH SIZE & SHAPE 	1. large jaws engulf prey; 2. protrusible jaws suck in prey; 3. elongate jaws reach into crevices; 4. elongate lower jaw feeds on prey seen above	1. lingcod 2. trumpetfish 3. butterflyfish 4. halfbeak
TEETH SIZE & SHAPE 	1. fisheaters have pointed, knife-like teeth; 2. snails and clam eaters have plate-like grinders and crushers; 3. choppers on plants and corals have fused, beak-like	1. barracuda 2. bat ray 3. parrotfish

Body Part	Adaptation	Purpose
Mouth	at the end of the snout, symmetrical	open water feeder
	angled downward/longer upper jaw	feeds on prey below it, bottom feeder
	angled upward/longer lower jaw	feeds on prey above it, surface feeder
	strong jaws - teeth	preys on other fish
	sucker-shaped	eats small plants and animals
	barbels	feeds off bottom, senses food in murky water
	duckbill jaws	grasps its prey
	no teeth	eats plankton
	very large mouth	surrounds prey
Eyes	both on the same side of the head	lies flat on the bottom of the ocean
	small	shallow water fish
	large	usually deep water fish
Fins	Large, forked caudal fin	strong, fast swimmer
	spines on fins	protection, more difficult to swallow, can be poisonous
	large pelvic fins	bottom dweller
	small pelvic fins	open water swimmer
Body shape	round	difficult to swallow, slow swimmer
	flat bottomed	feeds on the bottom
	long, eel-like	hides in rocks and weeds
	torpedo shaped	high speed swimmer
	flat from side to side	almost invisible from the front and rear, feeds above and below
	flat from top to bottom	hides on the bottom
	hump backed	stable in fast moving water

Fantastic Fish © Susan Seagraves

Body Part	Adaptation	Purpose
Scales	large	uses its scales for protection
	small	fast swimmer
Coloration	no markings	swims in the open water
	stripes	hides in seaweeds and grasses
	mottled	hides in rocks or on the bottom
	countershading - dark on top, light on bottom	less visible to predators above and below
	stripe through eye	helps to camouflage fish by hiding the eye
	false eye spot	predator will attack tail giving fish a greater chance to escape

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